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Ten Years of Farm Sales of Milk in Four Ohio Markets

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TEN YEARS OF FARM SALES OF MILK IN FOUR OHIO MARKETS

R. W. SHERMAN AND C. G. McBRIDE

INTRODUCTION

This study deals with records of individual sales of whole milk of large groups of shippers of the Canton, Cincinnati, Columbus, and Dayton markets for a period of at least 10 years for each market. Two previous studies were made of the data for the years 1925 to 1929. The first was Department of Rural Economics Mimeograph Bulletin 76, and the second appeared as Bulletin 498 of the Ohio Agricultural Experiment Station.

An attempt is made in this study to measure some of the changes in volume and butterfat content of milk deliveries of individual shippers. These changes have been of importance in affecting the milk supply of the markets. Changes made by the individual shipper may be due either to influences from the market, such as market butterfat standards, differentials, premiums, and city inspection, or to changes in farm practices which follow the selling of whole milk over a period of years. Data as used in making this study measure only the changes and do not determine the causes for change.

There are three main phases of the study. The first deals with the butterfat content of the milk as delivered by the shippers. The second deals with the average daily, monthly, and yearly volume of sales. The third phase is a more detailed analysis along the same lines of a group of continuous shippers of these four markets.

The introduction and use of base and surplus plans have been the greatest change in marketing practices in the major markets of Ohio during the period 1925 to 1936 for which data were collected. These plans have been adopted in an attempt to adjust supply to market needs and to bring about a more equitable distribution of returns to producers. Most milk shippers selling in markets with these plans have made attempts to adjust their milk sales to them, thereby introducing changes in farm practices as well as in volume and butterfat content of milk.

Records for this study were obtained from milk distributors and cooperative milk marketing associations. Complete cooperation was given by both of these agencies in furnishing the records in each of the four markets.

SOURCE OF DATA

Data used in this study consisted of records of sales of milk, and of its butterfat content, by individual milk shippers by months. For most of the shippers the records were for all milk sold by them, but in a few instances milk shippers sold some milk through other channels and it was not possible to obtain and include records of such sales in this study.

From the Cincinnati market the records of 303 shippers were taken for the first 5 years included in the study, 1925 to 1929, inclusive. The records of these 303 shippers were taken at the end of this 5-year period. Records from only

those who had shipped milk continuously for the full period were taken. This method of taking records accounts for the constant number of records for the first 5 years of the study.

The sample was increased to 394 in 1931, and from that year on no new shippers were added to the sample. In 1936 only 225 of the 394 shippers were still selling through the same distributing outlet. No attempt was made to follow up those shippers who had shifted to other outlets. For Columbus the records of 400 shippers were taken for 1927 to 1929 in the same way as explained for the Cincinnati market. No new shippers were added to the Columbus sample and no attempt was made to follow up those who shifted to different outlets. In 1936 only 203 of the original 400 shippers were still selling to the same distributors.

In the Dayton market a much larger sample was taken. It included all shippers selling to one of the large distributors and a large sample from two other large distributors. In addition, a few shippers' records were taken from smaller companies, and where possible the records of those who shifted to other distributors were obtained and included.

For the Canton market all records available were taken. For some years over 90 per cent of the shippers of the market were included, but in other years a somewhat smaller percentage of the records was obtained.

Shippers were classified as regular or irregular. The regular shippers were those who were in the market at the beginning and the close of each 12-month period. In a few instances they failed to sell any milk for a month or two in the shortest period of production, but in practically all instances they were in the market constantly for the full year. Classification was made on a yearly basis and some producers were regular for some years and irregular during other years. The irregular shippers were those who appeared in the market for a part of the year only. In some cases they may have been selling milk for the whole year, but continuous records of their sales were not available and it was necessary to classify them as irregular for the purpose of this study. There was no way to determine definitely whether or not they had been selling whole milk continuously.

In table 1 is given the number of shippers' records taken from each market by years, with the classification as to regular and irregular shippers.

TABLE 1.—Number of shippers' records included in markets studied, 1925-1936

Year	Dayton		Canton		Columbus	Cincinnati	Total
	Regular	Irregular	Regular	Irregular	Regular	Regular	
1925	.....	.....	287	226	.....	303	816
1926	233	475	305	206	.....	303	1,522
1927	360	507	462	260	400	303	2,292
1928	360	548	462	286	400	303	2,359
1929	360	493	462	340	400	303	2,358
1930	415	296	695	112	359	319	2,196
1931	399	596	519	306	319	394	2,533
1932	743	176	538	120	271	378	2,226
1933	665	241	627	83	221	320	2,157
1934	687	144	654	65	217	288	2,055
1935	630	130	658	63	213	259	1,953
1936	516	99	620	79	203	225	1,742

PART I. BUTTERFAT CONTENT OF MILK DELIVERIES

IMPORTANCE OF BUTTERFAT IN MARKET MILK

The butterfat content of milk sold for fluid use is one of the most important factors entering into the value of the milk. For instance, one Ohio market paid $2.52 for milk of 4 per cent butterfat used for sale as fluid milk and cream when butterfat averaged 30.1 cents per pound for the month. This gave a butterfat value of $1.204 in the milk based on the sour cream market. The market value of sweet cream would have been higher than this. There was, therefore, a maximum residual of about $1.32 for all other factors, such as skim milk, transportation, inspection, and all other costs connected with production and delivery of milk for fluid use to the dealer's plant. For the milk used in lower value classifications the price is often based on the butterfat value plus a small amount per hundred to pay for the skim.

For milk which tests more or less than the standard butterfat content, the price is adjusted directly on the variation from the standard. Most markets have been basing the butterfat differential (the butterfat differential is the amount added to or subtracted from the base price for each one-tenth per cent variation from base test) on the butter market quotations. This is an implication that the standard is the desirable market butterfat content and that the only change in value of milk varying from this is the value of the butterfat. With this principle well established in the markets, the price bargaining between producers and distributors seldom includes the butterfat differential as an important bargaining factor.

Shippers do not all look on the variation from the butterfat standard in the same light. To some, it is attractive to sell milk of a high butterfat content and receive a high price per hundred pounds, and, incidentally, to lower the percentage going for transportation. Other shippers note that it is not butterfat for which a premium is paid, but other factors as mentioned before. They attempt to produce and sell milk of a butterfat content which seems to give the best net price for all factors combined. Still other shippers make no effort to produce and sell milk of any particular butterfat content.

The practice of siphoning has frequently been used in times of low prices for surplus milk. In this method a siphon is placed in the can and some of the bottom milk of low fat content is drawn off. This practice makes it unnecessary to pay hauling charges on milk which, with the hauling charges deducted, has at times returned less than its butterfat value. Siphoning has occurred in markets where base and surplus plans have been in use and the price of surplus milk has been very low. Where a flat price is paid for all milk there is no motive to siphon.

Siphoning milk to bring it up to the butterfat standard will make it return almost as much for the milk sold as the total amount before siphoning when the differential is one-tenth of the price (with hauling deducted) for base milk divided by the standard. To the value of the siphoned milk must then be added the value of the low fat content of milk siphoned off. Therefore, the differential can be slightly lower and the shipper break even by drawing off enough of the low-fat-content milk to bring the test up to standard.

The trend of average butterfat content of milk received from all shippers in the study indicates that the butterfat standards and differentials have been definitely influential in raising the average butterfat content of market milk.

STANDARD BUTTERFAT CONTENT AND DIFFERENTIALS

Columbus and Dayton have both been on 4 per cent butterfat standards for the full period of the study. Canton was on a 3.5 per cent butterfat standard for the entire period. The Cincinnati shippers included in this study were on 3.5 per cent until October 1933, when they were shifted to a 3.7 per cent standard. All four markets now base their differentials on the butter market. Previously, three of the markets had fixed butterfat differentials which had been in existence for several years.

COMPUTATION OF AVERAGE BUTTERFAT CONTENT

The same method of computing the butterfat content of the total sample and of divisions of the sample was used as in the previous bulletin[1] dealing with sales and butterfat content of milk in the same four markets. The butterfat averages are all weighted. These averages are computed by dividing the total pounds of butterfat by the total pounds of milk in the sample for which the average butterfat content is being determined. The weighted average is used rather than the simple average because it gives the proper amount of importance to varying amounts of milk of different butterfat content.

AVERAGE BUTTERFAT CONTENT OF ALL MILK

The monthly butterfat content of all milk included in the study for each one of the four markets is shown graphically in figure 1, for the period from 1925 to 1936. All four markets have shown distinct upward trends in butterfat content of milk. This trend was particularly pronounced for all but the Cincinnati market from 1925 to 1929.

The Columbus and Dayton samples showed the smallest rise from 1930 to 1936, probably because the milk sold in these markets has for many years been of high butterfat content and most of the producers were already using the higher butterfat producing breeds of cows.

The butterfat standards are very definitely influential in affecting the butterfat content of milk coming into the market. Most shippers attempt to sell milk with a butterfat content at least as high as the standard because they are reluctant to receive less than the quoted price. Theoretically the shipper should produce milk of whatever butterfat content gives him the highest net return. If all shippers reacted this way it would be very important to establish a market standard and butterfat differential which would encourage them to furnish milk of the desired butterfat content.

It will be seen that the downward trend which was noticeable in the Cincinnati tests for 1925 to 1929 was arrested and turned definitely upward in 1930. From 1930 to 1936 the butterfat content of milk for this market showed more rise than that of any other of the four markets with the exception of Canton.

There is evidence in the Dayton and Columbus markets that the butterfat content of milk has practically reached its maximum until some new influences enter. The milk sold by shippers in both these markets was well above base tests for the year's average. Although the butterfat content of milk delivered by Cincinnati shippers was as far above the standard as that of Dayton and Columbus, the trend was still upward. Since 1928 the butterfat content of milk delivered by Cincinnati milk shippers has increased three-tenths of 1 per cent.

[1]Bulletin 498, Ohio Agricultural Experiment Station, 1932.

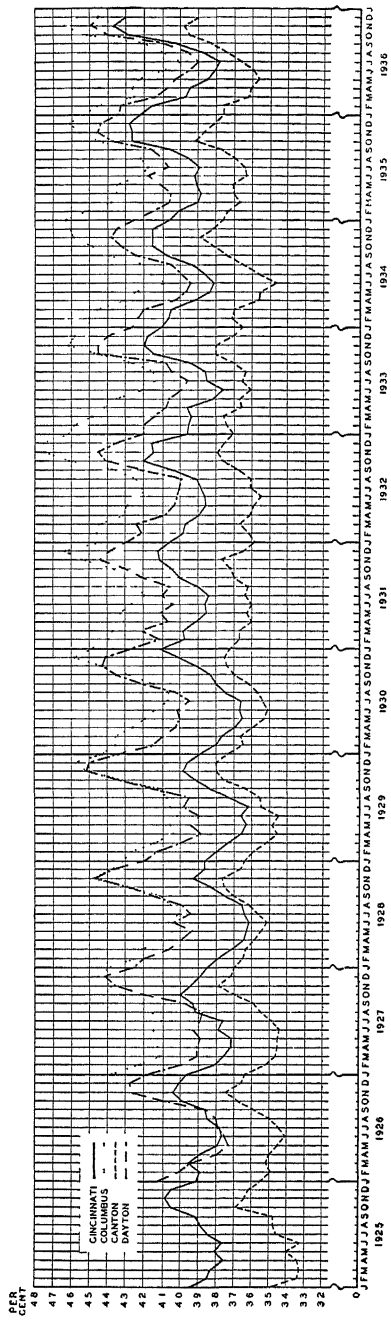

Fig. 1.—Weighted average butterfat content of all milk in samples studied in Cincinnati and Canton, 1925-1936; Dayton, 1926-1936; and Columbus, 1927-1929

During this time a change of two-tenths of 1 per cent upward in standard has been made. It will be interesting to see whether the butterfat content of milk in that market will rise as high as that of the two markets with 4 per cent standards. The butterfat content of milk in the Canton market has been rising steadily, and in 1936 was about as far above standard as that of the other markets.

The trend of butterfat content of milk can be ascertained very definitely by fitting a mathematical line of trend to the monthly butterfat content averages for the entire period of time covered in the study. For this purpose the following equations for line of best fit as determined by the method of least squares were derived from the monthly figures of butterfat content.

Columbus	$Y=4.1208+0.00184X$
Dayton	$Y=4.0625+0.00116X$
Cincinnati	$Y=3.7843+0.00182X$
Canton	$Y=3.4999+0.0019X$

When the sign of the monthly increment is positive, as in each of these four equations, it means that there is an average monthly increase in butterfat content of milk of the amount of the X increment.

The average monthly increases in butterfat content of milk for the Columbus, Canton, and Cincinnati markets were almost the same. The Dayton monthly increase was about two-thirds that of the other three.

The increase in the butterfat content of milk in the Columbus market for the 10-year period, as shown by the trend line, was from 4.21 per cent to 4.43 per cent. For the Dayton market in 11 years, the increase was from 4.06 per cent to 4.213 per cent. For the Cincinnati market in 12 years the increase was from 3.784 per cent to 4.046 per cent. For Canton in 12 years the increase was from 3.50 per cent to 3.773 per cent. In fitting a straight line of trend, as was done in this case, it is assumed that the trend is definitely in one direction. The straight line will not properly show a change in direction of the trend of the butterfat content of milk. Since the trend of butterfat content of milk in all four markets was upward, the straight line trend is comparatively accurate and has the advantage over actual figures of butterfat content of eliminating temporary and seasonal changes and giving a clearer picture of the trend in the butterfat content of delivered milk. A line of best fit with one change of direction[2] would no doubt show a flattening out of rate of increase for all four markets, and for Columbus would show a slight trend downward in the later years.

Table 2 gives the average yearly butterfat content of milk of each division of shippers from 1925 to 1936. It is interesting to note the upward trend in butterfat content of the milk delivered by all shippers. The significance of this upward trend can better be illustrated by showing how much more butterfat is delivered by each shipper, assuming the same amount of milk for the years compared. On the basis of average shipments of milk by the regular shippers in 1936, a shipper in the Canton market delivered 155 pounds more of butterfat in 1936 than he would have with the average test in 1925. For Dayton the 1936 amount of butterfat was 77 pounds more per shipper than on the same basis in 1926. The increase for Columbus from 1927 to 1936 was 54 pounds, and for Cincinnati the increase from 1925 to 1936 was 56 pounds.

[2]A second-degree parabola.

TABLE 2.—Weighted average butterfat content of milk delivered, by division of shippers in Canton, Dayton, Cincinnati, and Columbus markets, by years, 1925-1936

Division of shippers		Canton	Dayton	Columbus	Cincinnati
		Pct.	*Pct.*	*Pct.*	*Pct.*
Regular shippers:					
Summer	1925	3.48	.....	.....	3.95
	1926	3.54	4.02	.....	3.91
	1927	3.54	4.07	4.21	3.86
	1928	3.58	4.09	4.18	3.74
	1929	3.54	4.07	4.16	3.78
	1930	3.61	4.20	4.32	3.80
	1931	3.63	4.21	4.41	3.97
	1932	3.65	4.23	4.46	4.00
	1933	3.73	4.27	4.46	3.97
	1934	3.67	4.18	4.48	4.08
	1935	3.77	4.26	4.35	4.13
	1936	3.73	4.22	4.41	4.02
Winter	1925	3.44	.....	.....	3.81
	1926	3.49	3.96	.....	3.82
	1927	3.55	4.03	4.26	3.80
	1928	3.63	4.06	4.19	3.71
	1929	3.53	4.00	4.24	3.74
	1930	3.62	4.06	4.23	3.77
	1931	3.57	4.14	4.34	3.97
	1932	3.63	4.11	4.39	3.97
	1933	3.67	4.12	4.37	3.94
	1934	3.63	4.13	4.30	3.93
	1935	3.67	4.14	4.43	3.89
	1936	3.73	4.10	4.23	4.04
Irregular shippers:					
	1925	3.43	.....	.....	.....
	1926	3.54	3.88	.....	.....
	1927	3.59	3.97	.....	.....
	1928	3.75	4.19	.....	.....
	1929	3.74	4.15	.....	.....
	1930	3.80	4.17	.....	.....
	1931	3.79	4.20	.....	.....
	1932	3.71	4.23	.....	.....
	1933	3.73	4.11	.....	.....
	1934	3.73	4.19	.....	.....
	1935	3.85	4.01	.....	.....
	1936	3.96	4.22	.....	.....
All shippers:					
	1925	3.45	.....	.....	3.89
	1926	3.53	3.93	.....	3.88
	1927	3.56	4.02	4.22	3.84
	1928	3.63	4.12	4.19	3.73
	1929	3.59	4.09	4.19	3.77
	1930	3.62	4.15	4.27	3.78
	1931	3.66	4.19	4.37	3.97
	1932	3.65	4.17	4.42	3.98
	1933	3.70	4.17	4.40	3.95
	1934	3.66	4.15	4.37	4.00
	1935	3.73	4.19	4.39	4.02
	1936	3.74	4.16	4.31	4.03

COMPARISON OF BUTTERFAT CONTENT OF MILK DELIVERED BY WINTER AND SUMMER DAIRIES

The same method of dividing milk shippers into summer and winter divisions was used as in the previous bulletin[3] analyzing farm milk sales for the period 1925 to 1929. Those shippers who delivered at least 75 per cent as much milk in November as in June were classed as winter shippers. Those who shipped less than 75 per cent as much in November as in June were classed as summer shippers. The irregular shippers were not included in this classification. The butterfat content of milk for the summer and winter shippers of all four market samples is shown graphically in figure 2.

[3]Bulletin 498, Ohio Agricultural Experiment Station.

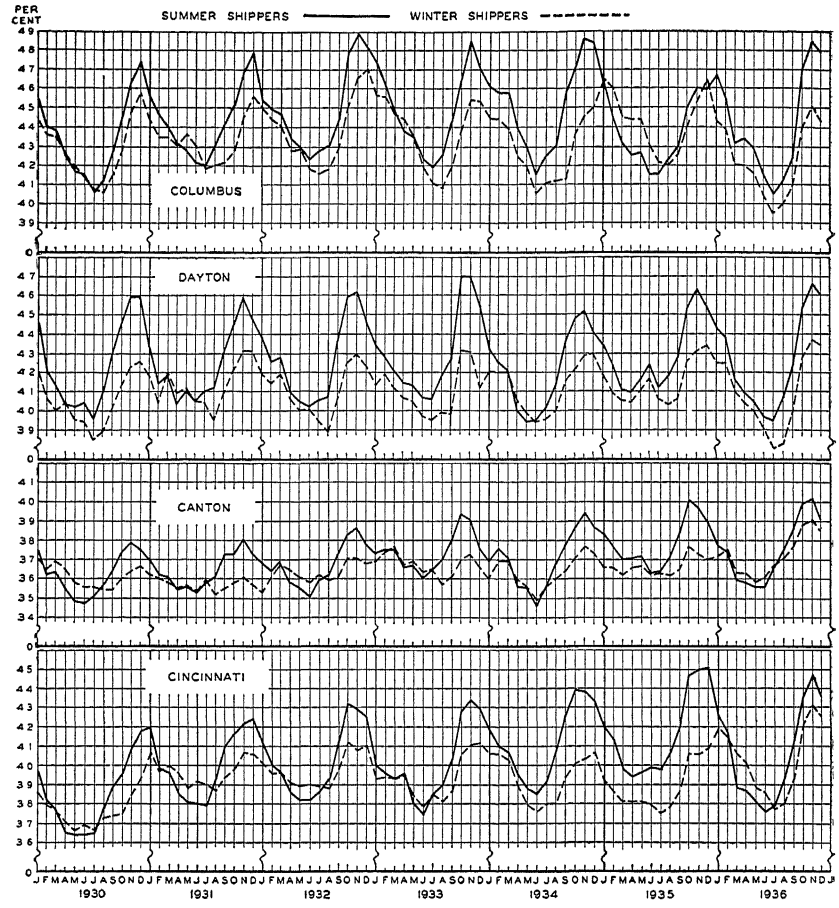

Fig. 2.—Weighted average butterfat content of milk delivered by summer and winter shippers of the Canton, Cincinnati, Dayton, and Columbus markets, 1930-1936

Columbus market.—It can be seen from the graph that the summer shippers delivered milk with definitely higher butterfat content than that of the winter shippers, with the exception of the first half of 1935. The tendency in this market has been for the milk delivered by the summer shippers to increase in butterfat content more than that of the winter shippers. The comparison of average butterfat content of milk between the summer and winter classifications for 1927, 1928, and 1929 that was given in the previous bulletin was very much the same as is shown here for 1935. The range for the 7 years for the summer shippers was 0.83 per cent and for the winter shippers, 0.66 per cent. The trend toward more variability in butterfat content of milk which was very noticeable in the years 1927-1929 continued, and in 1936 the milk from the summer shippers varied from 4.05 to 4.85 and that from the winter shippers, from 3.95 to 4.51.

The milk from the Columbus sample had the highest butterfat content for both divisions of shippers and also the highest degree of variability with the exception of the Cincinnati market.

Dayton market.—For only 6 months since January 1930 has the milk from the winter shippers of the Dayton market had a higher butterfat content than that from the summer shippers. This record shows a trend toward widening of the difference between the butterfat contents of the milk from the two divisions. The difference in the yearly weighted average butterfat content of milk from the summer and winter shippers was 0.07 per cent in 1929. It had increased to 0.15 per cent in 1933, and for 1935 and 1936 was still 0.12 per cent. The upward trend in butterfat content was, therefore, more pronounced in the milk from those shippers classified as summer.

The range in butterfat content figures was 0.76 per cent for the milk from summer and 0.56 per cent for that from winter shippers, and was just slightly less than in the Columbus market. In both the Dayton and Columbus markets part of the range can be attributed to secular trend of butterfat content figures but not nearly to as great an extent as in the other two markets.

There is no evidence of any decided change in seasonal variability in the butterfat content of the milk in the Dayton sample. An undue variation occurred in 1936, but the one year in itself would not be evidence enough to decide that variability was increasing.

Canton market.—The striking thing about the butterfat content of milk from both the summer and winter shippers of the Canton market is its definite upward trend. Approximately the same relationship between the two divisions continued throughout the entire period.

Much less variation occurred in the Canton sample than in the other markets. Butterfat content of milk of neither group fell to the same degree as in the other market samples during the months from December to June. The summer shippers continued to show definitely more seasonal variation than the winter shippers. For the 7-year period the range in butterfat content figures of the summer shippers was 0.55 per cent and for the winter shippers, 0.42 per cent. A large part of the variability of butterfat content of the milk from winter shippers as shown by this figure was due to the rise which occurred in 1936. This group of shippers showed much less seasonal variation than any group in the other markets.

Cincinnati market.—The downward trend in butterfat content which was noted for both groups from 1925 to 1928 was halted in 1929, and the trend was definitely upward from 1930 to 1936. From July 1934 to December 1935 there was an unusual spread between the butterfat content of milk from the winter and summer shippers, and at one time this spread reached 0.43 per cent. This extreme difference in butterfat content of milk, which lasted about a year and a half, was not accompanied by any change in relationship between the groups in per day per dairy sales, as can be seen by studying figure 6.

The range in butterfat content of milk for the 7 years was 0.65 per cent for the winter shippers and 0.87 per cent for the summer shippers. From each of these can be subtracted the secular trend of 0.153 per cent.

With the secular trend of butterfat content eliminated from each market, the variability for the milk from each group was as follows:

	Winter shippers	Summer shippers
	Pct.	*Pct.*
Columbus	0.505	0.675
Dayton	.463	.663
Canton	.260	.390
Cincinnati	.497	.727

SEASONAL VARIATION OF BUTTERFAT CONTENT OF MILK

The seasonal variation of butterfat content of milk is shown in figure 3 on a relative basis. The relatives are computed as follows: The Januarys for all years are averaged to obtain the average butterfat content of all January milk. The same is done for each month of the year. The 12 monthly figures are then averaged for the average butterfat content of the milk for the 7-year period. Each composite month's average is then divided by this figure. The resulting figures multiplied by 100 are the relatives.

The differences in butterfat content between markets are eliminated by this method and the seasonal variation for each market can be compared directly. The difference in the seasonal variation between the summer and winter divisions, which was mentioned in the previous section, is clearly shown here.

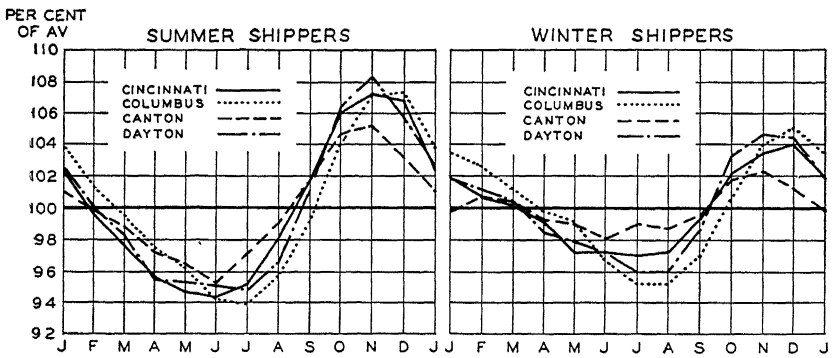

Fig. 3.—Seasonal variation of weighted average butterfat content of milk delivered by summer and winter shippers of the Canton, Cincinnati, Dayton, and Columbus markets, 1930-1936

Almost the same general monthly movement occurred in the butterfat content of the milk delivered by the two divisions of shippers with one outstanding exception. The butterfat content of the milk delivered by the summer shippers for August in each market was decidedly higher than that for July. This rise does not occur for the milk delivered by the winter shippers until September, probably because of the difference in the period of lactation of the herds of the two divisions. The peak of butterfat content of milk from the summer shippers of the Cincinnati, Canton, and Dayton markets came in November, and for Columbus in December. For the winter shippers the peak for Dayton and Canton came in November and for the other two markets in December.

Both divisions of shippers in the Columbus market show more relative decrease in butterfat content of milk from the winter to the summer months than in the previous period, 1927-1929. The lowest relative in the period 1925-1929 for the summer shippers was 95.6 and for the winter shippers, 96.5. The corresponding figures for the 1930-1936 period of the study were 93.9 and 95.2, respectively. The low and high points for the two periods for the Dayton and Canton markets changed very little. Slight changes occurred in the Cincinnati and Columbus markets.

Canton showed the least seasonal variation and Columbus the most. One basis of comparison is to add the monthly variations from 100 for both divisions of shippers and compare the totals. When this comparison is made it shows Canton with a total variation of 44.6, Cincinnati with 74.0, Dayton with 80.4, and Columbus with 81.2.

COMPARISON OF BUTTERFAT CONTENT OF MILK FROM REGULAR AND IRREGULAR SHIPPERS

The classification of irregular shippers occurred only in the Dayton and Canton markets, as in the other two markets records of only regular shippers were taken. The regular shipper classification is the total of the winter and summer classifications. Comparison of butterfat content of milk from regular and irregular shippers is shown in figure 4.

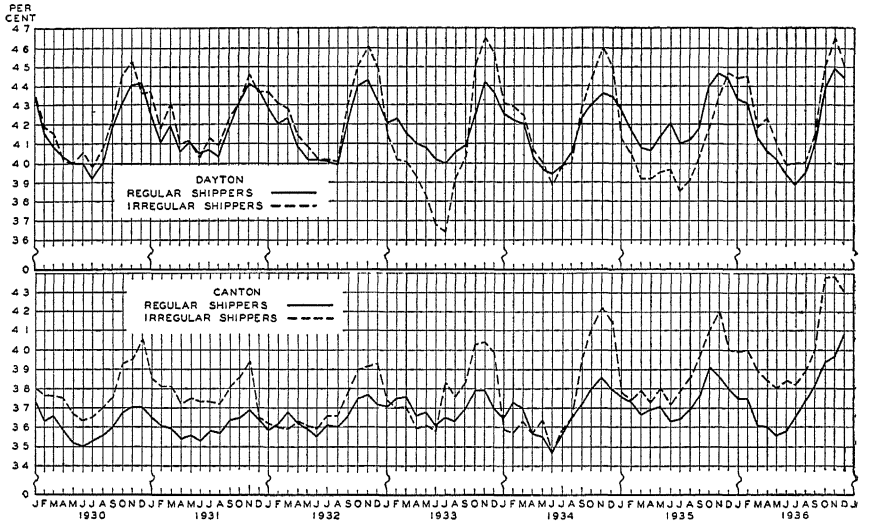

Fig. 4.—Weighted average butterfat content of milk delivered by regular and irregular shippers of the Dayton and Canton markets, 1930-1936

The tendency for the milk from irregular shippers to gain in butterfat content more than that of the regulars, as was indicated in the period 1925-1929, was not continued in the 1930-1936 period. In the Dayton market there was little difference in either actual butterfat content or trends, except that the milk from irregular shippers was more erratic in butterfat content. The butterfat

content of milk delivered by irregular shippers of the Canton market was definitely higher than that of milk from the regular shippers. In October 1936 the difference was 0.44 per cent, or one-ninth more fat per 100 pounds of milk. From 1925 to 1936 the butterfat content of milk from the Canton irregular shippers rose from 3.43 to 3.96, and from 1926 to 1936 that for the Dayton irregular shippers rose from 3.88 to 4.22. This rise cannot be called a trend with as much accuracy as with regular shippers because the butterfat content figures represent too much change in the sample.

There was a decided increase in variability of the butterfat content of the milk from irregular shippers during the last 4 years of the study. There was also a big decrease in the number of shippers classed as irregular during these years, as can be seen in table 1.

A large part of the difference between the butterfat content of milk from the regular and irregular shippers can be explained by the varying size of the sample of the irregular group. In this bulletin some shippers are classed as irregular not because they are in and out of production but because the market uses them part of the time and at other times they must find a market somewhere else. If given a steady market they would be regular shippers. But a large proportion of the irregular shippers shift from one market outlet to another so frequently that for all purposes in the market their supply of milk is not reliable enough to be counted on for use in fluid sales. To have a complete picture of all the shippers of a market it would be necessary to know just how much milk the irregular shippers were selling when not delivering it as milk through the fluid market channel. To obtain this would be a task of almost impossible proportions.

BUTTERFAT CONTENT OF MILK BY VOLUME OF SHIPMENTS

For comparison of milk delivered and its butterfat content the shippers were divided into different groups by size of shipment as explained in the previous bulletin. The method was to divide the shippers into groups on the basis of yearly sales, using 10,000-pound class intervals. All shippers delivering over 100,000 pounds were placed in the same group. In all, there were 11 groups. The class intervals of 10,000 pounds on a yearly basis are equivalent to 27.4-pound intervals on a daily basis. For convenience to the reader the class intervals are given on both a yearly and a daily basis.

The butterfat content of milk delivered by the different groups is given in tables 3 and 4. In the previous bulletin these figures on butterfat content of milk were given by years for each group. For this bulletin the yearly figures were averaged for the years from the start of the data up to and including 1929 and again for the years from 1930 to 1936. This gives a larger sample representing each group and simplifies comparison both of different groups and of periods of time. With a few exceptions where the sample was extremely small for some groups, the butterfat content of the milk shows two definite tendencies: one is the upward trend of butterfat content as shown by the higher averages in the 1930-1936 period; the other is the general tendency for the butterfat content to decrease as the average size of shipments increases.

In only a few cases was the butterfat content of milk from individual groups lower in the 1930-1936 period than in the previous one. Since the groups were made up largely of the same shippers year after year, it would seem that these shippers were developing herds which produce milk of higher

TABLE 3.—Average butterfat content of milk by volume of shipments in the Canton market, 1925 to 1929 and 1930 to 1936, and in the Dayton market, 1926 to 1929 and 1930 to 1936

Canton

Shipments		Summer shippers		Winter shippers		Irregular shippers	
Yearly	Daily	1925 to 1929	1930 to 1936	1925 to 1929	1930 to 1936	1925 to 1929	1930 to 1936
Lb.	*Lb.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Under 10,000	Under 27.4	3.85	3.85	.....	3.58	3.82	3.99
10,000-19,999	27.4- 54.7	3.82	3.91	4.17	3.80	3.82	4.01
20,000-29,999	54.8- 82.1	3.77	3.86	3.74	3.88	3.79	4.03
30,000-39,999	82.2-109.5	3.72	3.81	3.64	3.82	3.75	3.84
40,000-49,999	109.6-136.9	3.54	3.72	3.59	3.78	3.70	3.85
50,000-59,999	137.0-164.3	3.57	3.65	3.52	3.72	3.58	3.88
60,000-69,999	164.4-191.7	3.54	3.60	3.51	3.57	3.53	3.72
70,000-79,999	191.8-219.1	3.46	3.66	3.47	3.52	3.61	3.80
80,000-89,999	219.2-246.5	3.54	3.54	3.50	3.57	3.44	3.70
90,000-99,999	246.6-273.9	3.38	3.57	3.32	3.45	3.48	3.75
Over 99,999	Over 273.9	3.39	3.50	3.51	3.41	3.41	3.42
Average of all classes		3.54	3.69	3.53	3.65	3.61	3.80

Dayton

		1926 to 1929	1930 to 1936	1926 to 1929	1930 to 1936	1926 to 1929	1930 to 1936
Under 10,000	Under 27.4	4.08	4.26	4.28	4.46	4.15	4.40
10,000-19,999	27.4- 54.7	4.23	4.32	4.22	4.29	4.15	4.23
20,000-29,999	54.8- 82.1	4.18	4.29	4.22	4.28	4.14	4.30
30,000-39,999	82.2-109.5	4.00	4.28	4.15	4.23	4.03	4.21
40,000-49,999	109.6-136.9	3.90	4.23	4.14	4.16	4.08	4.26
50,000-59,999	137.0-164.3	4.05	4.25	3.95	4.04	3.88	4.40
60,000-69,999	164.4-191.7	3.68	4.17	3.80	4.09	3.80	4.18
70,000-79,999	191.8-219.1	4.26	4.09	4.22	4.16	3.60	4.24
80,000-89,999	219.2-246.5	3.59	4.17	3.71	3.75	3.68	4.21
90,000-99,999	246.6-273.9	.....	3.96	.....	3.90	4.81	3.49
Over 99,999	Over 273.9	3.62	3.59	3.58	3.64	3.52	3.45
Average of all classes		4.06	4.22	4.01	4.11	4.05	4.16

butterfat content. In some of the markets the influence of siphoning entered in, but only a small part of the change in butterfat content can be attributed to this. In tables 3 and 4 there are 105 divisions of shippers which can be compared for the two periods. Only 11 of these showed a decrease in butterfat content of milk delivered for the 1930-1936 period. In all cases the average of all classes showed an increase from the earlier to the later period of the study.

The difference between the butterfat content of milk from the small and large shippers had decreased considerably in the 1930-1936 period as compared with the previous period. When the shippers were divided into three groups by size of shipments, the differences between the butterfat content of milk from shippers with the largest and smallest shipments ranged from 0.25 per cent for Cincinnati to 0.36 per cent for the Canton market. The range in the previous period was from 0.30 per cent for the Columbus market to 0.49 per cent in the Dayton market. In no particular group (with 10,000-pound class intervals) was the drop in butterfat content particularly noticeable, with the exception of the two groups with largest yearly shipments. Their decline was

greater than that for any other groups. For some reason the milk from the group of shippers with smallest shipments had a lower average butterfat content than the milk from the two groups next higher.

TABLE 4.—Average butterfat content of milk by volume of shipments in the Cincinnati market, 1925 to 1929 and 1930 to 1936, and in the Columbus market, 1927 to 1929 and 1930 to 1936

Cincinnati					
Shipments		Summer shippers		Winter shippers	
Yearly	Daily	1925 to 1929	1930 to 1936	1925 to 1929	1930 to 1936
Lb.	*Lb.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Under 10,000	Under 27.4	4.26	4.33	4.31	4.43
10,000-19,999	27.4- 54.7	4.01	4.23	3.95	4.24
20,000-29,999	54.8- 82.1	4.03	4.09	3.98	4.14
30,000-39,999	82.2-109.5	4.02	4.04	3.92	4.10
40,000-49,999	109.6-136.9	3.89	3.97	3.94	3.92
50,000-59,999	137.0-164.3	3.75	3.92	3.70	3.86
60,000-69,999	164.4-191.7	3.85	3.88	3.76	3.77
70,000-79,999	191.8-219.1	3.53	3.90	3.54	3.83
80,000-89,999	219.2-246.5	3.82	3.74	3.44	3.57
90,000-99,999	246.6-273.9	3.74	3.67	3.65	3.72
Over 99,999	Over 273.9	3.52	3.72	3.55	3.65
Average of all classes		3.85	4.00	3.78	3.93
Columbus					
		1927 to 1929	1930 to 1936	1927 to 1929	1930 to 1936
Under 10,000	Under 27.4	....	.....	.....	3.92
10,000-19,999	27.4- 54.7	4.25	4.68	4.56	4.63
20,000-29,999	54.8- 82.1	4.40	4.48	4.48	4.60
30,000-39,999	82.2-109.5	4.22	4.48	4.48	4.49
40,000-49,999	109.6-136.9	4.21	4.46	4.28	4.50
50,000-59,999	137.0-164.3	4.18	4.41	4.10	4.32
60,000-69,999	164.4-191.7	4.04	4.47	4.22	4.34
70,000-79,999	191.8-219.1	4.27	4.50	4.25	4.31
80,000-89,999	219.2-246.5	4.31	4.44	4.23	4.44
90,000-99,999	246.6-273.9	4.16	4.37	3.90	4.28
Over 99,999	Over 273.9	3.97	4.16	4.01	4.00
Average of all classes		4.18	4.42	4.23	4.33

For purposes of a simple comparison of the butterfat content of the milk from groups with different volumes of shipments, all years were combined and the shippers divided into only three groups. This method of classification gives much larger samples for each group and practically eliminates chance of error from sampling. The butterfat content of the milk delivered by these groups is shown in table 5. Although in the Dayton market these data show that the butterfat content of the milk delivered by the irregular shippers was lower for each group than the average for the milk delivered by the summer and winter dairies combined, just the opposite holds true in the Canton market. The average butterfat content of all milk received from irregular shippers in the Dayton sample from 1930 to 1936 was 4.17 per cent. For the regular shippers the average was 4.19 per cent. The corresponding figures for the Canton market were 3.79 per cent for the milk delivered by irregular shippers and 3.67

per cent for the milk delivered by the regular shippers. The butterfat content of all milk delivered by regular shippers in the Cincinnati sample was 4.01 per cent. For the Columbus shippers the butterfat content was 4.32 per cent.

TABLE 5.—Weighted average butterfat content of all milk shipped from 1930 to 1936 by volume of yearly shipments and by type of shippers in the Dayton, Canton, Cincinnati, and Columbus markets

Division of shippers	Dayton	Canton	Cincinnati	Columbus
	Pct.	*Pct.*	*Pct.*	*Pct.*
Summer:				
Under 30,000 lb.	4.30	3.88	4.14	4.51
30,000–59,999 lb.	4.25	3.74	4.00	4.43
Over 59,999 lb.	4.28	3.56	3.82	4.35
Winter:				
Under 30,000 lb.	4.29	3.87	4.18	4.59
30,000–59,999 lb.	4.18	3.77	3.97	4.30
Over 59,999 lb.	3.79	3.49	3.98	4.21
Irregular:				
Under 30,000 lb.	4.27	4.00	.....	.....
30,000–59,999 lb.	4.19	3.79	.....	.....
Over 59,999 lb.	3.90	3.68	.....	.....

When the groups are combined in this way the relation between the average size of milk shipments and the butterfat content of the milk is clearly shown. The milk delivered by the group with less than 30,000 pounds per year per shipper (less than 82.2 pounds per day per shipper) had the highest butterfat content; the butterfat content of the milk from the group with deliveries of between 30,000 and 59,999 pounds per year per shipper was next high; and the milk delivered by the group with the largest shipments (over 164.4 pounds per day per shipper) had the lowest butterfat content. This relationship held true in all cases in these four markets with the exception of the milk from the group of summer dairies of the Dayton market with shipments of over 59,999 pounds per year and the milk from the group of winter dairies of the Cincinnati market with corresponding size shipments.

Comparing the average butterfat content of milk from the different groups as shown in table 5 with that of the same groups for the period 1925-1929 shows that in practically all instances the 1930-1936 figures are decidedly higher. There was also less difference in butterfat content of milk delivered by the different groups than there was in the 1925-1929 period.

The real significance of the differences in butterfat content of milk between groups of shippers is in what each group furnishes to the market in terms of the relation of butterfat and milk. Since all markets have different percentages of their shippers in each group, their total market receipts are, therefore, affected accordingly. Each milk dealer is also affected directly by these differences when taking on or dropping shippers.

PART II. MILK SALES PER SHIPPER

AVERAGE SALES PER DAY PER SHIPPER

The average daily sales by months were figured for all four markets. These are shown in figure 5. Records for all shippers were included in these averages. The shipments for the irregular shippers were adjusted to the actual number of months they delivered milk to the market. Sales outside the market were not obtained and the sales per day per shipper may be influenced slightly in a few cases where such sales were made.

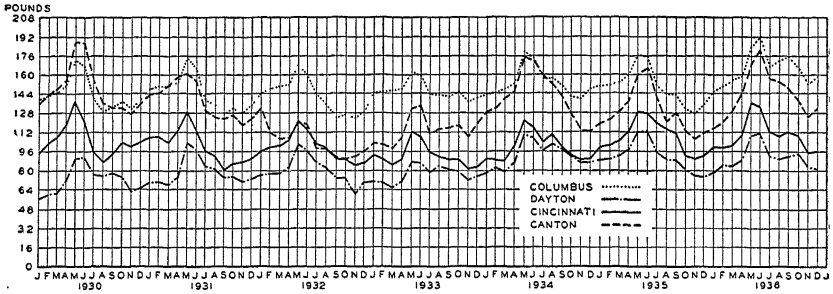

Fig. 5.—Average sales per day per shipper, by months, in the Canton, Dayton, Cincinnati, and Columbus markets, 1930-1936

Very little similarity existed among markets in average daily shipments except in the seasonal variation. The peak in deliveries came in either May or June in all markets and for all years. The lowest deliveries usually came in October, November, or December.

The shippers of the Dayton market had the lowest average daily sales through the entire period. The order of the four markets in average daily sales from lowest to highest was Dayton, Cincinnati, Canton, and Columbus. For a few months the Cincinnati average was above the Canton average, and the Canton daily sales were above those of Columbus for a few months.

For the 7 years the Dayton average daily shipments per shipper varied from 56.3 pounds to 113.0 pounds. The Cincinnati shippers varied from 80.7 to 138.4 pounds per day. For Columbus the corresponding figures were 124.0 and 192.5 pounds, and for the Canton shippers, 90.1 and 188.5 pounds.

There was a definite upward trend in the average daily shipments of the Dayton sample. The average daily shipment for 1936 was 18.3 pounds higher than the average for 1930. There was less difference between the average shipments for the Dayton sample and those of the other markets during the 1930 to 1936 period than in the previous period. This smaller difference was due partly to the upward trend in shipments in the Dayton market and partly to the adjustment of the figures in the two markets where irregular shippers were included. These figures were not adjusted in the previous bulletin for the corresponding chart.

The apparent downward trend of the average daily shipments for Cincinnati from 1925 to 1929 continued until 1933, and from then on the trend was upward until in 1936 the average was practically the same as for 1929. The Canton averages dropped from 147.7 in 1930 to 108.0 in 1932 and went back up

to 143.2 for 1936. The low average for 1932 and 1933 can be accounted for in part in the milk sold through outside channels. The amount of this could not be ascertained but was no doubt of considerable consequence. In a study[4] made in 1933 and 1934 of a large group of shippers in the four markets included in this study it was found that the Canton shippers had sold 13.77 per cent of their milk through outside channels in 1933 as compared with only 2.37 per cent in 1930. This comparison would indicate that the production per day per shipper during 1932 and 1933, even with the milk sold through outside channels, had

[4]Mimeograph Bulletin 76, Department of Rural Economics, The Ohio State University and Ohio Agricultural Experiment Station, 1935.

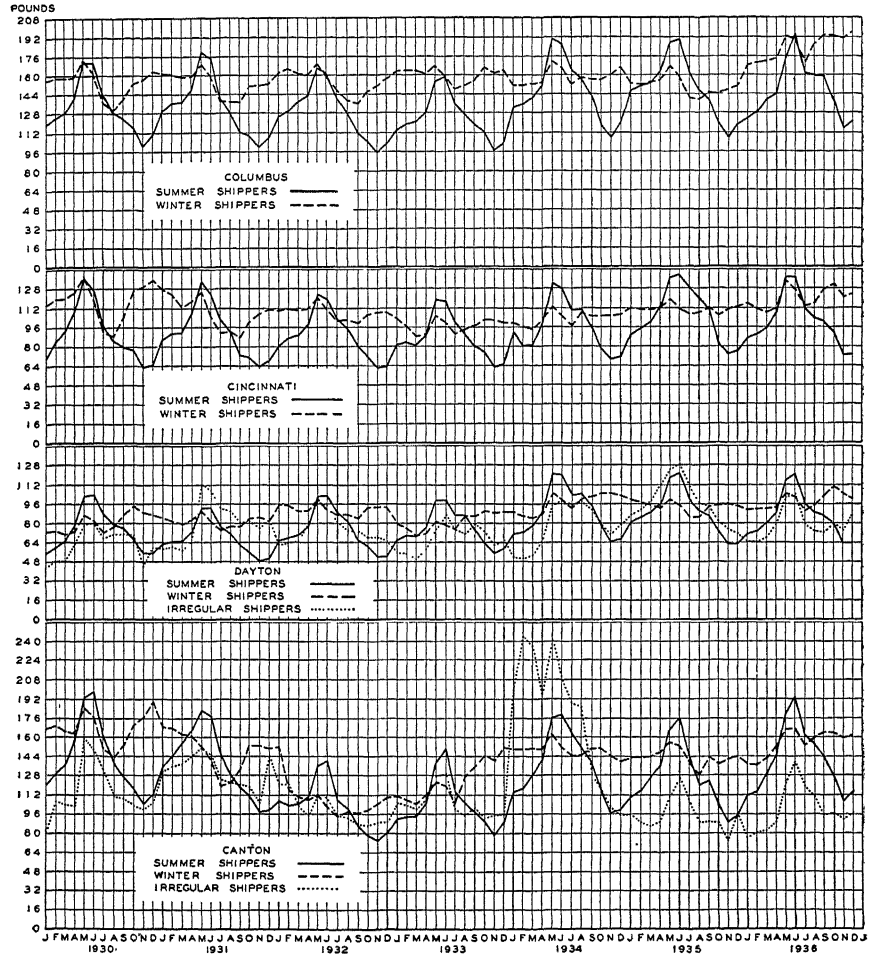

Fig. 6.—Average sales per day per shipper by types of shippers in the Canton, Cincinnati, Dayton, and Columbus markets, by months, 1930-1936

been considerably less than in the years previous and probably than in the years following. These lower shipments per producer were made possible by the fact that the base and surplus plan was in effect part of this time and the shippers also had reasonably good outside markets for their milk. There was also a decrease of over 4 per cent in the number of cows per farm of the shippers included in the study in the Canton market.

From 1930 to 1936 the Columbus sample of shippers had the largest shipments of the four markets. This can be accounted for in part by the average size of dairy herds shown in the study mentioned before. The census for 1934 also shows a higher number of cows per farm in the Columbus market than in the Canton area.

There was much less seasonal variation of average daily shipments in all four markets, with the exception of Dayton, than was shown in the years 1925 to 1929. One explanation of this smaller variation may be the rather general use of base and surplus plans during the later period. The effect of such plans is to encourage the shipper to level out his sales through the year. Such plans also make possible the sale of surplus milk through other than the regular fluid channels, and these sales would not show up in this study.

Figure 6 shows the average daily shipments per shipper by months of the shippers of the four markets divided into summer, winter, and irregular classifications. In all four markets the winter shippers were much less variable than either the summer or irregular shippers. The irregular shippers were slightly less variable than the summer shippers when the per day per dairy sales of the irregular shippers were adjusted to the number of months actually in the market.

In table 6 are shown the figures of variability of sales in percentages for two periods. The difference between the highest and lowest sales per day per shipper was figured in percentage of the lowest for each year, and the average of all years in the period was taken as representative of the period. The two periods were those included in the analysis of the data for 1925 to 1929 and the years 1930 to 1936 included in the present study. With only three exceptions the variability had decreased in the latter period. The winter shippers of Canton and Dayton were more variable, and the irregular shippers of the Dayton market were just the same for both periods. In the first column are given the percentages for all shippers in each market. The decrease in variability was very much alike in all four markets.

TABLE 6.—Average difference between highest and lowest monthly per day per shipper sales, in per cent of lowest, for two periods, 1925 to 1929 and 1930 to 1936

Market	Period	All shippers	Winter shippers	Summer shippers	Irregulars
		Pct.	*Pct.*	*Pct.*	*Pct.*
Columbus	1927-1929	54.0	24.9	97.2	.....
	1930-1936	32.5	21.0	72.7	.....
Cincinnati	1925-1929	66.4	41.2	119.8	.....
	1930-1936	46.5	28.9	98.6	.....
Canton	1925-1929	69.8	30.0	104.2	80.4
	1930-1936	46.5	34.8	88.3	74.9
Dayton	1926-1929	64.3	12.2	111.1	78.6
	1930-1936	48.9	24.6	91.8	78.6

The sample from the Columbus market shows the least variability and the other three markets are practically alike. The significant fact is that of the decrease in variability. Part of this decrease can no doubt be credited to the base and surplus plan of selling milk, and part to numerous other factors.

There is no noticeable difference in trends of milk shipments of the different divisions of shippers in any of the four markets, with the exception of the irregular group of the Canton market. The very high average daily shipments of the irregular shippers of this market for the first 8 months of 1934 were built up by a few very large shippers who shipped for a few months and then dropped out. They were necessarily classed as irregular shippers. The sample of irregular shippers for this period was small, and the few shippers with large shipments weighted the averages heavily upward. With this exception, there was a slight downward trend shown for the Canton irregular shippers as compared with practically no trend for the summer and winter shippers on the same market.

The time of highest shipments of the summer shippers occurred at practically the same time for each market and each year. The same was true for the time of lowest shipments. No particular month or months can be singled out as the usual high or low points of shipments for the winter shippers. The shipments of these dairies for May are usually slightly higher or lower than those of the months just preceding or following, but in few instances are this month's shipments appreciably higher than those of any one other month. In many instances the winter shippers have their highest production in the fall months.

YEARLY SHIPMENTS OF PRODUCERS

The amount of milk delivered per year per producer by each division of shippers from 1930 to 1936 is given in table 7.

TABLE 7.—Amount of milk delivered per shipper each year, by divisions, in the Canton, Dayton, Cincinnati, and Columbus markets, 1930-1936

Market	1930	1931	1932	1933	1934	1935	1936
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Canton:							
Summer shippers	51,701	50,637	37,539	38,062	49,357	45,903	51,386
Winter shippers	61,204	54,249	39,950	45,105	54,395	52,307	56,827
Irregular shippers	25,991	40,706	26,381	18,891	36,152	18,381	18,905
All shippers	51,018	48,013	36,633	38,965	49,903	45,541	49,583
Dayton:							
Summer shippers	26,786	24,783	27,140	27,507	32,368	32,407	31,448
Winter shippers	29,342	29,851	33,534	29,652	35,332	34,348	35,957
Irregular shippers	12,992	17,253	16,105	10,160	15,580	20,705	17,229
All shippers	21,625	21,301	27,344	23,833	30,871	31,092	30,970
Cincinnati:							
Summer shippers	33,176	33,560	32,910	31,836	34,489	38,582	36,800
Winter shippers	43,051	39,718	39,756	35,624	37,756	40,622	44,130
All shippers	38,500	36,780	36,315	33,801	36,213	39,464	40,091
Columbus:							
Summer shippers	48,183	48,792	47,176	45,367	53,130	54,333	53,783
Winter shippers	56,166	55,826	56,583	58,609	57,673	55,058	67,165
All shippers	52,519	52,761	52,036	53,396	55,852	54,683	60,243

The yearly deliveries of the irregular shippers fluctuate more widely than the deliveries of the regular shippers. This greater fluctuation is due partly to the changing constituency of the sample, partly to the changing portion of the year's shipment records available, and partly to wide fluctuations in farm practices of the irregular shippers. Figures adjusted to number of months' shipments included vary much less.[5]

The deliveries of the winter shippers were higher than those of the summer shippers without exception. There was more difference between the shipments of the two divisions from 1930 to 1936 than existed from 1925 to 1929. The Columbus sample is the only one that showed a steady trend in total yearly milk deliveries. In the other three market samples, the average yearly deliveries per shipper were much more irregular than in the sample for Columbus.

Table 8 shows the percentage distribution of shippers into groups by size of shipments where the groups have been combined in the same manner as in table 5.

TABLE 8.—Per cent of shippers classified as to regularity and volume of shipment in the Canton, Dayton, Columbus, and Cincinnati markets, 1930-1936

Market	Yearly volume of shipments, in pounds			Total
	Below 30,000	30,000-59,999	Above 59,999	
Dayton:				
Regular shippers	63	30	7	100
Irregular shippers	72	23	5	100
Weighted average	66	28	6	100
Canton:				
Regular shippers	26	49	25	100
Irregular shippers	41	42	17	100
Weighted average	28	48	24	100
Columbus:				
Weighted average	16	53	31	100
Cincinnati:				
Weighted average	48	39	13	100

The distribution of the shippers in this classification is different in each market. In Dayton 66 per cent of the shippers had yearly shipments of less than 30,000 pounds, or one 10-gallon can per day, a decrease in percentage of shippers in this group over the period 1926-1929. The increase in the Dayton market was in the group of 30,000 to 59,999 pounds per year. The group with largest shipments had only 6 per cent of the total number of shippers in this market.

The distribution of the Canton shippers in the three divisions shows just the opposite from that in Dayton. The percentage in the two divisions of shippers with the smaller shipments had increased materially, but the percentage in the group with the larger shipments had decreased. All the change occurring in the Columbus market was toward larger shipments. In the Cincinnati market most of the change was in the increase in the lowest classification and the decrease in the second classification.

[5]See table 10.

TABLE 9.—Per cent of shippers by volume of shipment in the Canton, Dayton, Columbus, and Cincinnati markets, 1930-1936

Pounds per year	Canton shippers			Dayton shippers			Columbus shippers		Cincinnati shippers	
	Summer	Winter	Irregular	Summer	Winter	Irregular	Summer	Winter	Summer	Winter
Under 10,000	0.4	0.4	3.9	2.7	2.9	16.3	.....	0.2	2.8	1.8
10,000-19,999	8.3	5.7	14.4	31.0	29.6	34.3	5.0	3.1	26.6	18.6
20,000-29,999	18.9	17.5	22.7	31.9	29.0	21.5	16.4	9.0	22.5	24.5
30,000-39,999	19.4	19.6	19.7	17.4	18.1	13.4	23.1	17.3	19.5	19.8
40,000-49,999	16.3	16.1	12.8	8.0	8.3	6.8	20.5	21.0	11.0	12.1
50,000-59,999	13.2	13.0	9.8	4.0	4.0	2.4	10.9	12.5	7.0	8.5
60,000-69,999	8.3	8.4	5.4	1.6	1.7	1.9	8.9	10.3	4.0	2.9
70,000-79,999	5.4	5.3	3.7	1.0	.8	1.1	4.1	8.8	2.8	2.6
80,000-89,999	3.2	3.8	2.5	.6	1.1	.8	3.4	5.9	1.4	2.4
90,000-99,999	2.5	3.0	1.2	.4	1.1	.4	2.3	3.2	.6	2.0
Over 99,999	4.1	7.2	3.9	1.4	3.4	1.1	5.4	8.7	1.8	4.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The Columbus sample had the largest percentage of shippers in the classification with large shipments and the lowest percentage in the classification with small shipments. In the Dayton market only about 4 shippers of each 100 had average daily shipments of more than 274 pounds in the period 1926-1929, and 6 per 100 had such shipments from 1930 to 1936. Only one shipper in the Columbus sample had less than 10,000 pounds delivered in any of the 7 years from 1930 to 1936 inclusive.

Table 9 shows the percentage of shippers by 10,000-pound groups and also divides the regular shippers into the summer and winter classifications. This table brings out plainly the difference between the four markets in size of shipments and also the difference between the different classifications of shippers.

AVERAGE DAILY SALES OF IRREGULAR SHIPPERS

The average daily shipments of milk per shipper for the irregular shippers are shown in table 10. The shipments as shown in this table have been adjusted to the number of months during which milk was actually shipped. The unadjusted averages are of relatively little importance, since for the purpose of this bulletin only milk shipments through the regular fluid milk channels were obtained. Some of the irregular shippers may have been regular producers selling through other channels part of the time. If the total sales of these shippers were obtained they might show these men to be fairly regular producers and shippers.

TABLE 10.—Sales per day per shipper for irregular shippers of the Dayton and Canton markets, 1930-1936, adjusted to number of months of actual sales

Market and month	1930	1931	1932	1933	1934	1935	1936
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Dayton:							
January....	43.7	58.4	61.5	54.4	51.7	86.4	65.4
February....	48.6	60.4	63.3	53.6	50.9	92.0	65.5
March.....	48.1	57.0	65.5	50.1	53.1	99.3	68.0
April.....	61.6	65.4	79.9	58.0	65.1	112.6	78.0
May.....	78.5	114.0	98.5	75.6	94.2	124.8	101.1
June.....	80.5	107.9	94.3	85.6	98.9	129.2	104.1
July.....	67.3	92.5	81.6	74.9	95.4	109.4	79.3
August.....	71.2	90.2	74.0	71.7	98.1	97.6	73.1
September...	70.9	80.9	73.1	79.0	91.3	93.7	72.4
October.....	69.8	81.3	67.9	73.8	80.1	82.1	79.6
November...	44.1	75.9	68.3	61.1	70.0	75.3	74.6
December....	60.0	82.4	65.7	66.1	78.7	71.3	86.1
Year's average.....	61.8	87.3	74.9	65.0	76.9	99.7	77.9
Canton:							
January.....	80.2	131.5	121.6	105.4	197.8	96.1	76.2
February....	107.4	135.8	121.3	103.1	243.9	88.8	81.1
March.....	103.6	138.2	102.3	100.4	235.9	85.6	82.9
April.....	102.9	144.4	94.6	107.1	196.7	89.6	89.5
May.....	158.4	151.1	109.4	127.3	241.1	109.6	122.2
June.....	149.8	144.7	109.2	129.2	210.7	124.9	139.3
July.....	132.3	124.5	95.1	99.9	189.0	107.4	118.1
August.....	110.7	122.2	92.5	93.6	186.3	89.1	109.4
September...	109.3	120.2	86.7	101.4	129.3	90.4	95.4
October.....	102.9	118.1	86.1	92.4	117.6	88.3	96.8
November...	99.5	106.6	89.5	95.1	101.2	74.4	91.7
December....	105.7	144.3	90.6	95.9	95.4	96.5	97.4
Year's average.....	115.3	130.3	97.5	105.6	168.2	95.1	98.7

The adjusted average daily sales of the irregular shippers in the Canton market were lower than the average for all shippers except for the year 1934. In that year there were only a few shippers classed as irregular, and some of these had large shipments. The adjusted per day per dairy sales of the Dayton irregular shippers were higher than the sales of the regular shippers during 2 of the 7 years.

INDEXES OF SEASONAL VARIATION IN MILK SHIPMENTS

The seasonal variation of milk shipments of all shippers from each market included in the study is shown in figure 7. The same method was used as for the seasonal variation of the butterfat content of milk. This method has been described for figure 3.

Of the four market samples, those of Canton and Cincinnati were most nearly alike in seasonal variation. The Columbus sample showed the least variation of any. The Dayton shippers were farther below the year's average during the first 4 months of the year than the shippers of the other three markets, and they were also more above average during August, September, and October. This relationship was almost identical to the one which occurred during the period 1925-1929.

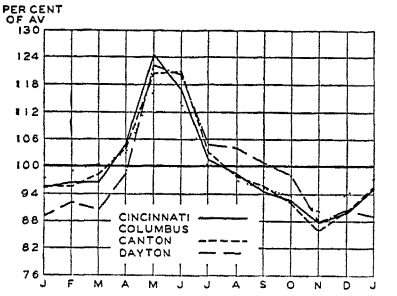

Fig. 7.—Seasonal variation of milk sales per day per shipper for the Canton, Dayton, Columbus, and Cincinnati markets, 1930-1936

In all four markets the seasonal variation was much less pronounced from 1930 to 1936 than during the earlier period. At least part of the improvement can be credited to the base and surplus plans which were in use in these markets during most of this period. It is interesting to note that the sample of Columbus shippers was less variable in seasonal shipments than the samples from the three other markets, as it had been also in the 1925-1929 period. The Columbus shippers had made approximately the same improvement as the others even though they were less variable at the start of 1930. No doubt the larger shipments of the shippers from this market were largely responsible for more even deliveries. The producers with large shipments are usually less variable than those with smaller shipments.

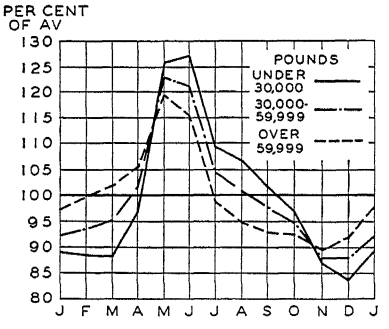

Fig. 8.—Seasonal variation of milk sales of combined samples of Columbus, Cincinnati, Dayton, and Canton markets, classified by volume of yearly shipments, 1930-1936

Shippers were divided into three groups (by size of shipments) and their seasonal variation was figured. These relatives are shown in figure 8. The deliveries of shippers for all four markets were combined into this classification, which gives a large number of shippers

in each class and is very accurate in showing seasonal variation of shippers of different sizes. The method of deriving seasonal curves used here is the same as explained previously for figure 3.

There is a very distinct relation between the size of shipment and seasonal variation. The smaller the shipments the more variable they are likely to be. The variability was much less on this basis during the 1930-1936 period than from 1925 to 1929. When the lowest month of deliveries is used as base, the volume of milk from the group with smallest deliveries varied 75.6 per cent in the period 1925-1929 and 50.6 per cent for 1930-1936. The second group varied 65.8 per cent for the first period and 40.0 per cent for the latter period. The volume of milk from the group with largest shipments varied 55.0 per cent and 33.9 per cent for the two periods, respectively. These records show a very definite improvement in seasonal variation in all three groups.

Not only is there a noticeable difference in amount of seasonal variability between the three groups, but also in the months in which the three groups were above and below their yearly average. The shippers with largest shipments were above their year's average from March to June and below for the other 8 months. The shippers with smallest shipments were above average from May to September. The middle group was above average from April to August. In percentage of average sales for the year the three groups were nearest alike in November. The group with large shipments came much nearer producing milk as the fluid market needed it than did the groups with smaller shipments.

PROPORTION OF MILK FURNISHED BY EACH GROUP OF SHIPPERS BASED ON SIZE OF SHIPMENTS

The proportion of milk furnished by groups of shippers with different size of shipments is very important to the market. In figure 9 both the percentage of total shippers and the percentage of the total milk each group furnishes are shown graphically. The bar to the left in each case represents the percentage of shippers falling in that group and the bar immediately to its right represents the percentage of milk delivered by that group.

In Dayton and Cincinnati the two groups of shippers delivering less than 20,000 pounds furnish a comparatively important percentage of the market supply. Of the Dayton shippers, 38.2 per cent fell into these two groups and furnished the market with 17 per cent of the milk. During the period 1925-1929 this group of shippers was much more important in the Dayton market than from 1930 to 1936. The trend of the average daily sales of the Dayton sample of shippers has been definitely upward. During the earlier period slightly over half of the shippers were in these two size groups, and they furnished just about one-fourth of the milk. The two groups with small shipments in Cincinnati constituted 24.9 per cent of all shippers and furnished 10.2 per cent of the milk, a large increase over the 1925-1929 period.

The two groups with small shipments were of practically no importance in Columbus and Canton. About 10 per cent of the smallest shippers could have been dropped from the Canton market and the milk supply decreased only 2 per cent.

Those shippers delivering over 99,999 pounds per year were important in each market. In the Dayton market, with only 2 per cent of the shippers in this group, 10.7 per cent of the milk was furnished by them, and 11.2 per cent of Cincinnati's milk came from the shippers of this size. These shippers supplied 14 per cent of Canton's milk and 17.6 per cent of the Columbus milk.

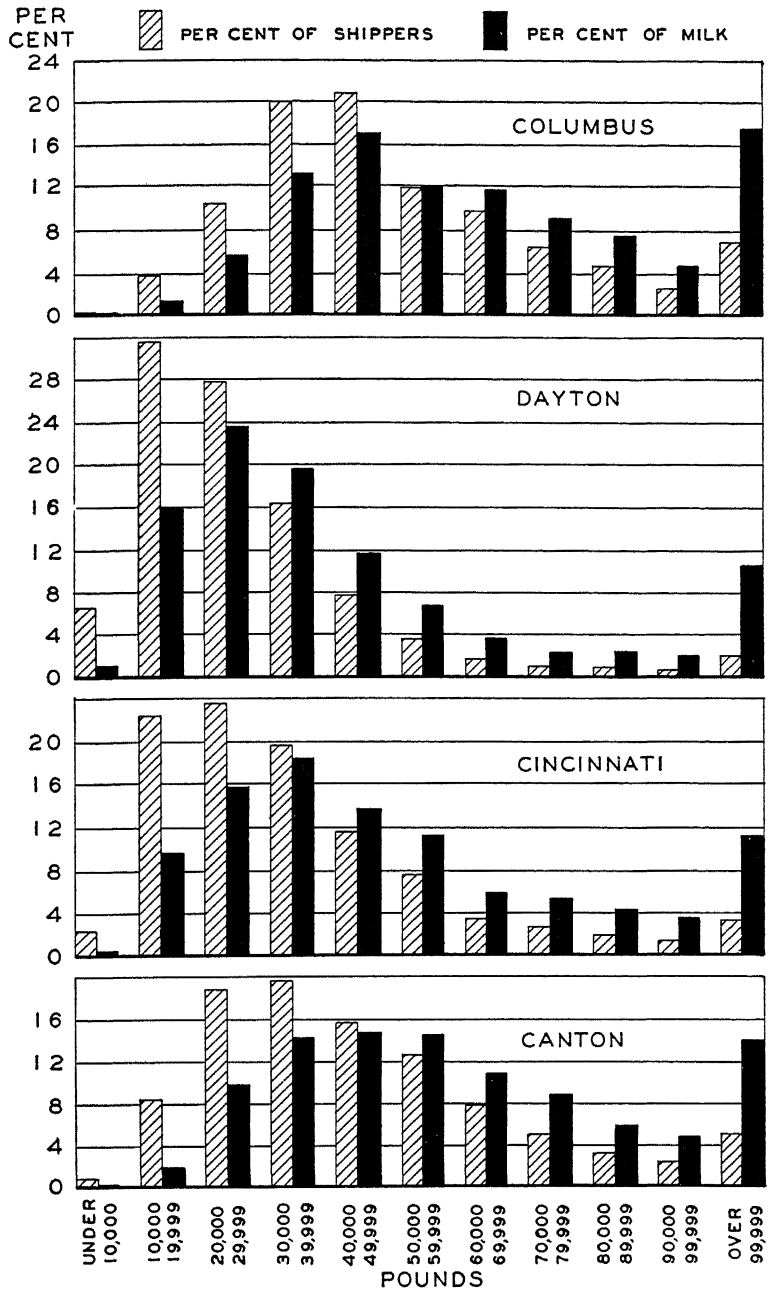

Fig. 9.—Per cent of shippers and per cent of milk delivered, by yearly volume of shipments, in samples from the Columbus, Canton, Dayton, and Cincinnati markets, 1930-1936

TABLE 11.—Shipments of last 4 months of year as percentage of total year's shipments, classified by amount of milk shipped per year per shipper for the Canton and Dayton markets, 1930-1936

Yearly shipments Lb.	Summer shippers							Winter shippers							Irregular shippers						
	1930 Pct.	1931 Pct.	1932 Pct.	1933 Pct.	1934 Pct.	1935 Pct.	1936 Pct.	1930 Pct.	1931 Pct.	1932 Pct.	1933 Pct.	1934 Pct.	1935 Pct.	1936 Pct.	1930 Pct.	1931 Pct.	1932 Pct.	1933 Pct.	1934 Pct.	1935 Pct.	1936 Pct.
Canton																					
Under 10,000	24.0	27.6	.....	14.5	.....	26.6	38.7	.....	40.8	34.4	42.1	.....	50.5	.....	100.0	19.3	31.6	2.6	.....	.....	.....
10,000-19,999	27.0	25.6	24.8	26.6	26.8	27.4	28.3	39.0	31.9	32.7	37.1	36.6	33.9	43.6	59.8	25.5	34.9	38.2	58.0	24.6	16.1
20,000-29,999	27.6	25.7	25.4	27.5	28.2	27.6	28.4	36.0	33.3	31.7	36.6	35.0	34.7	36.3	52.1	24.8	35.1	14.8	44.5	34.8	18.6
30,000-39,999	27.3	25.9	25.9	28.7	27.7	27.1	29.3	36.0	33.7	31.8	38.8	34.3	33.4	36.7	48.0	23.6	34.1	18.0	35.3	20.3	27.2
40,000-49,999	26.8	25.1	25.6	28.6	27.8	27.0	29.5	36.3	32.8	31.0	38.3	33.0	33.5	34.5	48.8	23.2	41.6	35.9	49.9	28.2	31.4
50,000-59,999	26.4	26.5	26.8	28.9	28.1	27.6	29.5	34.9	32.6	31.4	38.5	31.8	32.4	34.9	40.9	25.4	28.3	21.0	37.1	33.8	23.2
60,000-69,999	26.4	24.5	24.4	29.4	27.9	28.1	29.2	35.2	34.7	30.7	39.1	33.6	32.7	34.7	41.5	22.2	27.9	13.4	33.7	.....	29.8
70,000-79,999	27.4	26.2	27.6	30.6	27.4	26.4	29.2	34.4	30.8	30.0	40.6	33.2	33.7	34.6	34.2	21.9	48.4	23.9	34.6	23.5	.....
80,000-89,999	28.2	27.8	25.9	29.1	26.9	28.4	29.2	35.3	34.5	29.9	43.7	33.4	32.3	32.5	40.8	23.4	50.4	.....	37.7	.....	26.5
90,000-99,999	27.5	25.9	28.2	28.4	32.1	27.2	29.0	33.1	34.1	31.2	39.8	31.8	31.3	35.5	50.0	25.1	100.0	78.0	11.0	49.2	.....
Over 99,999	27.5	25.1	27.1	29.3	27.4	28.3	28.9	32.7	33.1	33.0	38.5	31.0	32.5	34.0	41.5	23.2	23.8	.....	11.1	16.2	.....
All classes	27.1	25.7	26.0	28.5	27.7	27.4	29.2	34.5	33.2	31.5	38.7	32.8	33.0	34.8	45.6	23.7	34.1	20.4	27.1	27.4	23.7
Dayton																					
Under 10,000	28.8	25.8	26.1	24.2	29.3	20.5	29.5	46.6	38.7	36.4	41.2	42.6	34.2	44.0	26.0	29.5	9.3	21.6	23.1	8.6	25.5
10,000-19,999	29.0	26.4	25.8	28.3	27.5	27.5	28.7	40.6	35.1	33.9	37.6	37.8	36.3	37.8	26.6	36.6	24.8	33.7	26.3	19.1	16.5
20,000-29,999	28.3	27.0	26.2	27.7	29.3	26.5	28.1	37.8	35.4	34.4	36.9	37.1	34.5	36.5	27.7	40.3	22.0	40.3	22.3	20.9	20.5
30,000-39,999	29.1	27.2	25.9	28.4	27.7	26.5	28.6	35.1	33.8	32.6	37.0	36.6	33.3	35.9	27.9	38.6	35.7	49.7	38.6	18.0	19.6
40,000-49,999	28.1	24.8	27.4	25.8	30.0	26.0	28.7	36.9	34.4	30.7	37.7	36.0	34.3	35.7	29.2	40.2	27.1	31.7	40.1	21.9	10.8
50,000-59,999	25.5	27.2	25.2	29.2	29.1	25.8	28.4	40.5	30.8	31.9	38.1	35.2	34.2	33.0	26.9	42.5	100.0	25.4	27.7	21.9	32.6
60,000-69,999	29.7	26.2	24.2	28.9	26.9	25.7	38.8	33.8	29.6	32.7	35.7	34.9	36.7	35.5	20.9	44.5	26.3	93.7	25.8	17.6	29.1
70,000-79,999	28.7	28.8	24.8	25.9	31.1	27.2	28.8	.....	.....	36.6	33.6	33.2	30.9	32.7	36.8	40.9	47.6	100.0	.....	12.4	.....
80,000-89,999	24.1	.....	24.9	28.0	25.8	31.3	.....	36.2	30.9	31.5	34.2	34.2	30.6	35.4	.....	33.2	.....	52.8	31.5	6.2	.....
90,000-99,999	27.4	22.7	23.2	.....	27.9	28.3	.....	.....	32.6	32.1	33.4	33.2	30.8	36.0	30.7	51.1	40.3	.....	.....	.....	3.7
Over 99,999	29.0	27.1	23.0	28.2	28.5	26.6	27.4	34.9	30.7	32.6	33.7	33.9	30.2	34.2	100.0	46.2	18.5	19.2	47.5	17.0	.....
All classes	28.5	26.6	25.8	27.8	28.6	26.6	28.5	37.2	33.6	33.0	36.6	35.9	33.6	35.6	27.7	40.0	27.0	37.0	32.2	18.0	19.0

TABLE 12.—Shipments of last 4 months of year as percentage of total year's shipments, classified by amount of milk shipped per year per shipper for the Columbus and Cincinnati markets, 1930-1936

Yearly shipments Lb.	Summer shippers							Winter shippers						
	1930 Pct.	1931 Pct.	1932 Pct.	1933 Pct.	1934 Pct.	1935 Pct.	1936 Pct.	1930 Pct.	1931 Pct.	1932 Pct.	1933 Pct.	1934 Pct.	1935 Pct.	1936 Pct.
Columbus														
Under 10,000	.....	.....	.....	.....	.....	.....	.....	49.1	.....	.....	29.1	.....	.....	.....
10,000-19,999	28.5	27.1	25.7	27.9	30.9	26.9	35.9	33.7	33.4	32.5	34.9	32.6	35.8	37.7
20,000-29,999	26.9	27.3	26.3	27.2	27.3	28.0	29 4	35.5	38.3	34.5	35.4	35.6	33.5	34.2
30,000-39,999	30.0	28.9	26.2	28.4	27.0	26.4	28.9	33.2	32.7	32.2	33.7	34.2	35.9	37.1
40,000-49,999	27.8	25.8	26.9	29.5	28 2	26.3	30.3	33.9	32.0	31.2	35.7	33.1	32.2	35.0
50,000-59,999	29.2	27.1	27.1	28.2	27.5	27.3	29.8	33.7	32.9	31.4	33.4	33.8	32.8	37.3
60,000-69,999	29.2	24.8	26.8	27.0	30.7	26.4	30.1	33.8	31.2	32.6	34.4	33.3	33.4	35.6
70,000-79,999	28.2	27.0	26.7	28.9	26.8	28.0	31.8	33.2	31.2	31.2	32 8	33.4	31.9	34.7
80,000-89,999	28.6	26.8	27.4	33.3	25.9	30.8	31.5	33.0	32.8	31.7	32.2	34.5	30.1	32.4
90,000-99,999	25.7	25.9	26.6	30.2	30.4	25.5	33.1	31.1	32.5	30.7	32.8	33.3	31.6	35.8
Over 99,999	29.3	27.4	26.6	32.5	26.9	27.1	30.0	32.9	31.9	31.6	33.6	34.3	32.9	34.7
All classes	28.7	26.9	26.7	29.0	28.0	27.2	30.3	33.4	32.3	31.7	33.8	33.8	32.7	35.2
Cincinnati														
Under 10,000	22.1	26.6	21.2	22.9	30.5	22.9	24.9	51.1	36.7	29.7	41.8	45.2	30.8	47.6
10,000-19,999	24.8	24 5	25.0	26.0	26.7	26.4	27.8	42.1	33.8	34.0	36.0	36.8	34.5	39.7
20,000-29,999	24.7	24.8	24.7	25.5	28.0	26.4	29.1	37.6	32.5	32.3	35.2	35.4	33.8	37.5
30,000-39,999	27.2	24.6	25.4	27.1	25.7	24.7	28.3	35.4	32.1	33.3	34.4	33.9	36.1	34.7
40,000-49,999	27.8	25.6	27.1	28.4	28.1	28.2	28.2	35.6	30.6	33.8	33.9	34.0	35.1	34.9
50,000-59,999	30.5	27.2	27.1	26.7	27.2	28.9	27.9	33.4	31.1	32.4	34 9	32.9	31.8	33.7
60,000-69,999	26.3	25.4	24.6	28.2	26.4	26.7	28.5	35.9	27.2	31.0	34.3	33.3	30.8	36.0
70,000-79,999	25.7	22.0	21.3	28.8	29.9	28.8	29.8	36.3	32.1	31.0	29.9	33.0	32.8	34.7
80,000-89,999	25.3	28.3	26.8	30.6	.....	26.4	25.7	33.2	29.9	30.7	33.1	37.4	32.0	34.3
90,000-99,999	26.9	21.7	.....	.....	26.2	24.1	.....	33.6	32.1	32.4	33.2	31.5	31.8	33.7
Over 99,999	25.3	23.3	27.7	28.9	30.0	27.4	22.4	33.5	30.2	31.6	32.6	33.6	31.9	33.8
All classes	26.4	24.8	25.7	27 2	27 5	27.1	28.0	35.3	32.6	32.5	34 3	34.2	33.4	35.1

The distribution of the shippers and milk furnished by them was much the same for Columbus and Canton. The Dayton and Cincinnati distributions were also much alike. With the exceptions noted before, the changes within each market are of relatively small importance, since they are mostly shifts among groups with large shipments. In all four markets there was a more even distribution in number of shippers in the different groups as compared with the 1925-1929 period.

MILK DELIVERIES OF LAST FOUR MONTHS OF YEAR

Milk shipments of the last 4 months of the year form an accurate measure of the amount of fluid demand which any shipper or group of shippers can be relied upon to supply. These 4 months are usually the low months of the year's shipments. In tables 11 and 12 are given the shipments of these 4 months as percentages of the total for the year by groups of shippers.

If all shippers were to supply the same amount of milk each month of the year, then any 4-month period would include 33⅓ per cent of the total for the year. The winter shippers of all four markets were very close to this figure for the last 4 months of the year. In many individual cases over 33⅓ per cent was delivered during this period by the winter shippers. The lowest percentage for any year by this group of shippers was in the Canton market for 1932 when they delivered 31.5 per cent of their year's total. The highest was in the same market for 1933 when 38.7 per cent was delivered during these 4 months.

The summer shippers furnished much less than 33⅓ per cent of their total year's milk during the shortage months. The highest percentage delivered by these shippers for the shortage months for any year was 29.2 per cent in the Canton market for 1936, and the lowest was 24.8 per cent in the Cincinnati market for 1931. The simple average of the percentages delivered by the summer shippers of all markets and for all years is 27.4 per cent. For the winter shippers the corresponding figure is 34.1 per cent, and for the irregular shippers, 28.8 per cent. The four markets were very much alike when compared on this basis. The lowest average for the summer shippers was 26.7 per cent for Cincinnati, and the highest, 28.1 per cent for Columbus. For the winter shippers, those of Columbus were lowest with 33.3 per cent and those of Dayton highest with 35.1 per cent.

The percentages delivered by the irregular shippers were more variable than those of the other shippers, largely because of the changes in size of the sample of those classed as irregular. In some cases only a few shippers were in this classification and their shipments of milk were for only a few months of the year. These percentages should not be given too much weight, for some of these shippers might be comparatively regular in shipments under favorable market conditions. In fact, their total shipments might be very good if their complete records were available to study.

CHANGING BETWEEN WINTER AND SUMMER CLASSIFICATION BY SHIPPERS

The shifting between the summer and winter classifications as shown in table 13 was more pronounced from 1930 to 1936 than for the 3 years previous. For 1927, 1928, and 1929 only slightly over 30 per cent of the shippers were classed as winter. By 1933 this percentage had risen to 45.3. It then fell to 40.6 in 1935, and was 43.9 in 1936.

A number of factors may be responsible for this change. During the years 1932 and 1933 the price paid for surplus milk in fluid milk markets was so low that it discouraged heavy production during the summer months, but the comparatively high prices for milk for fluid uses encouraged the production during the winter months. Other outlets for surplus milk were more profitable than those offered by the fluid milk distributor, and surplus milk in the summer months was diverted to other channels, particularly in the Canton market, where cheese factory outlets were available. In this market in 1932, over 57 per cent of the shippers were classed as winter, whereas in 1930 only 35 per cent fell into the winter classification.

TABLE 13.—Number of summer and winter shippers in the Dayton, Canton, Cincinnati, and Columbus samples, and per cent of total sample of shippers classed as winter shippers, by years, 1927-1936

Year	Per cent of shippers of four markets classed as winter	Number of shippers							
		Dayton		Canton		Cincinnati		Columbus	
		Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
1927....	32.2	230	130	341	121	208	95	255	145
1928....	32.8	220	140	363	99	209	94	232	168
1929....	30.4	264	96	329	133	206	97	263	137
1930....	43.3	253	162	450	245	147	172	164	195
1931....	50.9	197	202	277	242	188	206	139	180
1932....	50.0	410	333	230	308	190	188	131	140
1933....	55.3	267	398	310	317	154	166	87	134
1934....	50.0	291	396	414	240	136	152	87	130
1935....	40.6	361	269	428	230	147	112	110	103
1936....	43.9	269	247	380	240	124	101	105	98

That there was about the same amount of shifting among all groups of shippers would indicate that the factors which affected the shippers with large daily deliveries to change their seasonal shipments affected the producers with small- and average-size shipments in the same way. In all four markets a higher percentage of the shippers of large amounts of milk than of small fell into the winter classification. This division was more noticeable from 1930 to 1936 than during the period included in the previous bulletin.

PART III. ANALYSIS OF A SPECIAL GROUP OF CONTINUOUS SHIPPERS

A group of shippers who had delivered milk for each month for the entire period of the study was selected from each market for additional study. The purpose was to make further analysis of their sales and also to see how they differed from the entire market samples in milk deliveries. In table 14 are given the number of shippers included and the periods covered in the analysis.

TABLE 14.—Number of continuous shippers and period of continuous shipment in the Canton, Dayton, Cincinnati, and Columbus markets

Market	Period covered	Number of producers
Canton	1925–1936	135
Dayton	1926–1936	99
Cincinnati	1924–1936	50
Columbus	1927–1936	90
Total		374

The analysis of this group of shippers is on the basis of the full period of the study, and no division into the two periods 1925-1929 and 1930-1936 was made. In a group of this kind, no doubt all of those fluid milk shippers who entered the dairy business as a temporary farm enterprise have been eliminated. The difference in sales between these shippers and the total sample can be at least partly attributed to their greater permanence as fluid milk shippers. The effects on milk sales exerted by shippers of a temporary nature are eliminated.

The average yearly and daily milk sales per shipper of these 374 shippers differ somewhat from the average for the entire group. These averages are shown in table 15 and are for the entire period for which data were collected.

TABLE 15.—Weighted yearly and daily average shipments of summer and winter classification of 374 continuous shippers of four Ohio markets

Market	Years included	Summer		Winter		Average of both classifications	
		Yearly	Daily	Yearly	Daily	Yearly	Daily
		Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Canton	1925-1936	53,305	159.8	63,655	174.4	60,297	165.2
Dayton	1926-1936	28,146	77.1	32,258	88.3	30,087	82.4
Cincinnati	1924-1936	41,346	113.3	47,551	130.3	44,171	121.0
Columbus	1927-1936	50,883	139.4	58,430	160.1	54,658	149.8

For the entire group of shippers from the Canton market the average yearly shipment was 47,342 pounds; for Cincinnati, 39,501 pounds; for Dayton, 24,437 pounds; and for Columbus, 53,834 pounds. The special group of 374 continuous shippers in the Canton and Dayton markets therefore sold about 25 per cent more milk than the total sample group. For Cincinnati they sold only about 12 per cent more, and for Columbus only about 2 per cent more. Approximately the same relationship existed between the summer and winter classifications of shippers as in the total samples.

Another indication of a difference in size of shipment is the number of shippers by groups based on size of shipment as shown in table 16. The distribution of this special group of shippers shows a higher percentage of shippers with large volume and a lower percentage of shippers with small volume than for the entire group.

TABLE 16.—Number and per cent of 374 continuous milk shippers of four Ohio markets by amount of yearly deliveries, by market

Average yearly shipments	Number and per cent of producers							
	Cincinnati		Columbus		Dayton		Canton	
Lb.	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
0- 9,999	.....	.....	.....	.....	1	1.0	.....	.....
10,000-19,999	6	12.0	1	1.1	35	35.4	4	3.0
20,000-29,999	11	22.0	7	7.8	30	30.3	13	9.6
30,000-39,999	11	22.0	22	24.5	19	19.2	18	13.3
40,000-49,999	7	14.0	25	27.8	6	6.1	25	18.5
50,000-59,999	3	6.0	9	10.0	1	1.0	18	13.3
60,000-69,999	4	8.0	11	12.2	2	2.0	20	14.8
70,000-79,999	3	6.0	4	4.4	1	1.0	10	7.4
80,000-89,999	2	4.0	3	3.3	1	1.0	7	5.2
90,000-99,999	.....	.....	1	1.1	.....	.....	4	3.0
Over 99,999	3	6.0	7	7.8	3	3.0	16	11.9
Total	50	100.0	90	100.0	99	100.0	135	100.0

Only one of these continuous shippers sold an average of below 10,000 pounds of milk per year, and in only the Dayton market was there an important percentage of the shippers selling below 20,000 pounds per year. These data would indicate that not many of the shippers with small shipments are continuous shippers for any great length of time.

In table 17 the shippers are classified according to the number of years in which they performed as summer and winter dairies. The classification is different in each market because of the different number of years included. For Columbus only 10 years were included; for Dayton, 11 years; for Canton, 12 years; and for Cincinnati, 13 years. Shippers, therefore, who were classified as summer shippers for the entire time come under classifications as 0-10, 0-11, 0-12, and 0-13, according to their market.

TABLE 17.—Number of shippers by number of years classified as summer or winter from a group of 374 continuous shippers in four Ohio markets

Columbus			Dayton			Canton			Cincinnati		
Years as—		Number of shippers	Years as—		Number of shippers	Years as—		Number of shippers	Years as—		Number of shippers
Winter	Summer		Winter	Summer		Winter	Summer		Winter	Summer	
0	10	2	0	11	3	0	12	8	0	13	1
1	9	3	1	10	2	1	11	14	1	12	3
2	8	8	2	9	6	2	10	14	2	11	1
3	7	13	3	8	11	3	9	16	3	10	5
4	6	14	4	7	21	4	8	16	4	9	6
5	5	10	5	6	9	5	7	25	5	8	5
6	4	12	6	5	15	6	6	15	6	7	10
7	3	14	7	4	18	7	5	8	7	6	7
8	2	10	8	3	8	8	4	6	8	5	3
9	1	3	9	2	3	9	3	4	9	4	3
10	0	1	10	1	2	10	2	7	10	3	2
			11	0	1	11	1	0	11	2	2
						12	0	2	12	1	1
									13	0	1

It can be seen that few of the shippers were classified as either summer or winter for most of the period. Only 19 of the 374 remained as either summer or winter shippers for the entire period, and only 5 of these 19 stayed continuously in the winter classification. The division of shippers into winter and summer classifications was, of course, done on an arbitrary basis as explained before. Since June's production is largely determined by pasture conditions, the individual shipper's sales often varied enough for this one month to change his classification even without any other influences except those affecting the June pasture. Part of the shifting from one classification to the other was of comparatively little market significance, as it was only a slight change and often amounted to less than 10 per cent in June-November ratio.

For the Canton market, there was a heavy predominance of shippers classified as summer. In the other three markets the distribution was much alike, with most shippers falling about the same number of years into summer and winter classifications. Of the 374 shippers, 74 per cent had no fewer than 3 years in both seasonal classifications. Table 17 brings out that very few individual shippers are able to control the seasonality of their sales so as to hold a ratio between June and November which will correspond closely to fluid needs. It was shown previously in this bulletin, however, that the winter shippers as a group do have their milk sales adjusted very well to fluid sales.

This leads to the question of the exact number of years' shipments by market and by volume which fell into the two classifications. The answer is given in table 18.

TABLE 18.—Number of summer and winter classifications, by volume of individual years' shipments of a group of continuous shippers from four Ohio markets

Yearly shipments	Canton		Dayton		Cincinnati		Columbus	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Lb.								
Under 10,000	.....	.....	1	10	.....	.....	.....	.....
10,000-19,999	36	12	227	158	46	32	6	4
20,000-29,999	119	37	193	137	78	65	53	17
30,000-39,999	139	77	92	117	90	53	127	93
40,000-49,999	199	101	31	35	52	39	113	137
50,000-59,999	142	74	4	7	13	26	50	40
60,000-69,999	156	84	8	14	26	26	51	59
70,000-79,999	73	47	3	8	19	20	13	27
80,000-89,999	36	48	.....	11	17	9	9	21
90,000-99,999	25	23	.....	.....	.....	.....	1	9
Over 99,999	95	97	16	17	13	26	26	44
Total	1,020	600	575	514	354	296	449	451

A fairly even division occurred for the total of all shippers in all but the Canton market, where 63 per cent of all years fell into the summer classification. For the Canton shippers only those with over 79,999 pounds per year were fairly evenly divided as to the two classes. In each market the shippers with the larger volume were classed more often as winter dairies than were those with smaller shipments. There was practically no difference between these 374 shippers and the total sample in percentage of individual years classified as summer and winter. The percentage of individual years classified as summer production years for the 374 shippers was 63 for Canton, 53 for Dayton, 54 for Cincinnati, and 50 for Columbus. For the total sample the percentages were, respectively, 62, 52, 55, and 52. It is therefore evident that very little relation exists between continuity of shipment and the type of milk shipper as far as seasonal sales are concerned.

There has never been any way devised to measure accurately the effect of base and surplus plans of buying milk on the volume of sales by the shippers. It has been demonstrated rather conclusively that monthly sales over the year tend to level out with the use of base and surplus plans. The relation between such plans and total yearly volume is more difficult to analyze.

This special group of shippers has been studied from the standpoint of what happened to their sales volume when they changed from a so-called summer shipper to a winter shipper and vice versa. Table 19 presents the number of milk shippers who had a smaller or larger volume of sales accompanying both types of changes.

There were 1,309 individual changes in classification from 1924 to 1936. Of these changes, 651 were from winter to summer. Of these 651 changes, 376 were accompanied by larger yearly sales and 275 by decreased yearly sales. There were 659 changes from summer to winter classification. In 271 of these changes the year's sales increased, and in 387 they decreased.

TABLE 19.—Number of shippers of a sample of 374 continuous milk shippers of four Ohio markets changing from summer to winter and winter to summer classifications and how their volume of shipments changed, by years, 1924-1936

Change from previous year	1924 to 1925	1925 to 1926	1926 to 1927	1927 to 1928	1928 to 1929	1929 to 1930	1930 to 1931	1931 to 1932	1932 to 1933	1933 to 1934	1934 to 1935	1935 to 1936	All years
Winter to summer													
Higher volume ..	3	16	35	30	37	28	18	31	35	61	37	45	376
Lower volume ...	4	18	21	26	28	18	27	23	22	16	40	22	275
Summer to winter													
Higher volume ..	1	9	18	23	23	50	23	20	22	32	12	38	271
Lower volume ...	5	6	16	42	32	38	70	51	36	27	29	35	387
Total changes.....	13	49	90	121	120	134	138	135	115	136	118	140	1,309

In the Dayton market for the full period an average of 38 per cent of all shippers changed from one classification to the other each year. For the Cincinnati sample 35.2 per cent changed; for Canton 30.2 per cent; and for Columbus 33.7 per cent.

These changes in sales would seem to indicate that leveling out the season's sale of milk was accompanied to some degree by lower sales. When each year's changes are analyzed it can be seen that 1931 and 1932, the years when base and surplus plans were first in general use, show lower sales for an exceptionally high percentage of the shippers who changed to the winter classification.

The figures in table 19 are merely an indication that the sales through the regular channels decreased as a change from summer to winter classification came about and increased with changes from winter to summer classification. Before it could be said that base and surplus plans were responsible for changes in production, other factors would have to be studied. Two of these factors are: (1) the amount of milk sold through other channels during surplus months, and (2) whether the shippers had made a conscious attempt to adjust to the plan in use. These figures are, however, evidence that the base and surplus plans do not, as sometimes thought, effect higher total sales. This statement is based on the supposition that there has been some conscious attempt to adjust to such plans.

What happened in volume of shipments of those individual years' changes has been measured by the actual change in deliveries. In table 20 are given the totals, for all years combined, of the increases and decreases in sales accompanying the changes.

TABLE 20.—Amount by which shippers who changed from summer to winter and winter to summer classifications raised or lowered their sales, as a total for all years, by market

Change from previous year	Columbus	Dayton	Canton	Cincinnati
	Lb.	*Lb.*	*Lb.*	*Lb.*
Winter to summer:				
Higher	628,248	533,386	1,634,323	361,282
Lower	244,011	286,540	721,338	354,586
Net change (higher)	384,237	246 846	912,985	6,696
Summer to winter:				
Higher	400,816	330,521	720,538	202,330
Lower	481,909	503,529	1,601,855	478,234
Net change (lower)	81,093	173,008	881,317	275,904

The difference between the higher and lower figures for both the winter to summer and summer to winter changes is the net change up or down in volume of all years representing change. For example, the Columbus producers who changed from winter to summer had a net increase in sales for all years of change of 384,237 pounds of milk. Those Columbus shippers changing from the summer to the winter classification had a net decrease in sales of 81,093 pounds for all years of change. In each market the changes from winter to summer were accompanied by a substantial net increase in sales, except in Cincinnati, where the increase was small. For the changes from summer to winter the net decreases were substantial for all four markets.

The figures in table 20, like those of the preceding table, indicate that changes from one classification to the other are accompanied by a change either in yearly production or in disposition of part of the production. Therefore, if base and surplus plans are responsible for attempts to level out the year's sales, it can be said that there is no increase in yearly sales through regular channels as a result of these attempts. To know the total effect of attempts at leveling out sales it would be necessary to take the sales of each shipper, study the change from year to year, and arrive at the net change regardless of whether his classification (as used in this bulletin) had changed. Some shippers who shipped large amounts in summer months and practically none in the fall may have evened out their production because of the base and surplus plans, but still not enough to be placed in the winter classification. A study of this type would involve extreme detail, and the figures in the foregoing tables probably show the relationships between yearly production and changes in about the same way as would a complete study.

SUMMARY

This study is an analysis of records of monthly deliveries of milk shippers in the Canton, Cincinnati, Columbus, and Dayton markets. The records cover not less than 10 years in any market. This analysis follows closely the lines of an earlier study of the same groups, published in 1932 as Ohio Agricultural Experiment Station Bulletin 498. The changes following the years of extreme depression in milk prices are included in the present study and are significant.

One of the important evidences of adjustment to changing economic conditions is shown in the turnover of shippers. In the Cincinnati market the study was begun with 303 shippers who had shipped to the same plant continuously for 5 years, 1925-1929, inclusive. The sample was increased to 394 in 1931, and thereafter no new names were added. In 1936 only 225 of the 394 shippers were still selling through the same distributing outlet. Of 400 shippers in the Columbus market during 1927-1929, only 203 were selling to the same distributors in 1936.

It is indicated rather conclusively that the market standard for butterfat content on which price is based has an influence on the average butterfat content of the total milk receipts. In all four markets the average butterfat content has increased, and for the later years of the study was well above the market standards in each market. The butterfat differential is also important in this respect. These two factors are probably more influential than all other marketing factors combined in influencing milk shippers to attempt to change the butterfat content of milk to be delivered.

Milk delivered by shippers classed as summer shippers had a higher butterfat content than milk delivered by the winter shippers. Summer shippers are those who delivered less than 75 per cent as much in November as in June. Winter shippers are those who delivered at least 75 per cent as much milk in November as in June. The difference in butterfat content of milk from these two divisions of shippers was more pronounced for the last years of the study than for the years previous to 1930. The butterfat content of milk delivered by summer shippers from 1930 to 1936 had an average variation of 13 per cent from the month of June to November, whereas the butterfat content of milk delivered by the winter shippers varied only 6.4 per cent over the same period. These percentages represent much less variation than those for the previous period, 1925-1929. Less seasonal variation in butterfat content of milk apparently follows less seasonal variation in milk deliveries. This tendency is noted not only among groups of shippers with different degrees of variability during a certain period of time, but also from one period of time to another when variability of deliveries has changed.

The butterfat content of milk delivered by producers of small quantities was higher than that of milk from shippers of larger quantities. Little change from the period 1925-1929 occurred in this relation.

For the 7-year period from 1930 to 1936, the Columbus shippers delivered an average of 54,499 pounds per shipper per year; the Canton shippers, 45,665 pounds; the Cincinnati shippers, 37,309 pounds; and the Dayton shippers, 26,719 pounds. For the years previous to 1930 the Canton shippers were highest, Columbus shippers second.

There was a direct relationship between volume of deliveries and the seasonal variation of deliveries. The milk sales of large volume showed much less seasonal variation than those of small volume. There was also much less seasonal variation in deliveries during the later period of the study than during the period before 1930.

The winter shippers for all four markets combined delivered an average of 14.4 per cent more milk per shipper than the summer shippers, and in the individual markets varied from 12.1 per cent to 16.3 per cent more milk per shipper than the latter. During only 1934 and 1935 were the average yearly deliveries of the summer shippers within 10 per cent of the deliveries from the winter shippers. The winter shippers were more desirable for fluid milk markets from the standpoint of seasonal variation of sales than were the summer shippers. The latter almost doubled their sales from the month of lowest to the month of highest shipments, whereas the winter shippers increased only slightly over 25 per cent. The summer shippers were much less variable from 1930 to 1936 than from 1925 to 1929.

During the period before 1930, only Columbus, of the four markets studied, had used a base and surplus buying plan. During that period the Columbus sample had less seasonal variation than any of the other three markets. Since 1930 the other three markets have adopted some type of base and surplus plan and all have decreased their seasonal variation of sales. The Columbus shippers improved about the same amount as the other three, and are still much less variable in sales than the shippers of the other three markets.

A milk shipper does not conform to the same pattern of deliveries year after year. It is not possible for him to control production over a long period of time without a considerable seasonal variation during some years. From 1927 to 1936 the percentage of the total number of shippers classed as winter shippers varied from 30.4 in 1929 to 55.3 in 1933. Base and surplus plans tend to increase the percentage classed as winter shippers by placing a premium on more even sale of milk.

The sales of milk of those shippers who had sold through the same outlet for at least 10 years without interruption were higher than those for the total samples. These shippers were no different from the others in seasonal variation of milk deliveries. The records of milk deliveries of these continuous shippers indicate that the base and surplus plan of selling has a tendency to bring about a slight reduction of total sales as well as to decrease the month to month variation.